

Research Proposal

Airborne Contaminants and Adjacent Land Use

Problem Title. What is the contribution of airborne contaminants and adjacent land uses to impairments in highway runoff quality?

Problem Statement. Pollutants that fall on highways from air deposition or rainfall may come from sources over which WSDOT has no control. This project would attempt to set a baseline level for water quality that can be reasonably achieved in a watershed with ambient air quality impairments. This data may show that improvements in air quality could be used to improve highway runoff quality.

Associated questions that could be addressed by this proposal:

- Can highway runoff in airborne pollution non-attainment areas be reasonably expected to have higher concentrations of pollutants?
- If so, which pollutants (nutrients, metals, acidity, etc.)?

Literature Search. An on-line literature search was done. It showed that no studies have been conducted in Washington State. Several studies have been conducted in the Great Lakes area, Tampa Bay, Pennsylvania, and other locations. The data from those areas suggests that airborne deposition of metals and nutrients may be significant in some areas, but it appears to be very location-specific.

In 2002, Caltrans produced a study titled “*The Impact of Annual Average Daily Traffic on Highway Runoff Pollutant Concentrations*” that summarized 4 years of runoff monitoring data for 83 highway drainages in California. They did a detailed statistical analysis on the runoff data. The report concluded that for 16 of the 29 pollutants evaluated, adjacent land uses had a statistically significant effect on concentrations. The list of significant factors affecting water quality included antecedent dry period, seasonal cumulative rainfall, total event rainfall, maximum rain intensity, drainage area, and land use. The land-use correlation could be a result of air deposition effects.

Research Methods. This is a meta-analysis study – a synthesis of available literature about the topic. Conduct and summarize literature searches for existing data. It may be technically difficult to combine literature results on the air quality to stormwater quality relationship because of the different methodologies used by researchers. In addition, air pollution patterns will not necessarily follow the same geographical delineations as watersheds. The person doing the literature research must have a basic understanding of typical stormwater pollutants, airborne particulate terminology, and environmental statistics.

Partnering Opportunities. Relatively low. Air quality issues and impacts appear to be very region and site-specific, making partnering difficult at best.

Estimate of Costs and Research Duration. Estimated costs not developed, but expected to be greater than \$100,000.

Urgency, Payoff Potential, and Implementation. Research results are not needed for immediate WSDOT operations. The potential payoff includes determination of baseline water quality levels reasonably achievable in specific watersheds, depending on ambient air quality. However, a scientifically rigorous investigation would probably be very difficult and any determined relationship is likely to be considered exploratory data analysis, subject to re-evaluation as more studies are conducted over time. A cause/effect analysis would probably be speculative. Even if stormwater quality can be correlated with air deposition effects, the technical, regulatory and political situations for air quality issues are complex and controversial.

Research Proposer

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